

What is claimed is:

- 1 1. A computer-readable medium having stored thereon a data structure, the data
2 structure including data representing a characteristic of an optical member, the data
3 structure comprising:
4 at least one field containing information corresponding to a three-dimensional map of the
5 optical member, the map including a plurality of refractive index measurements taken at a
6 plurality of interior locations within the optical member.
- 1 2. The medium of claim 1, wherein the information includes compressed digital
2 data.
- 1 3. The medium of claim 1, wherein the medium includes at least one floppy disk.
- 1 4. The medium of claim 1, wherein the medium includes a hard disk.
- 1 5. The medium of claim 1, wherein the medium includes a CD-ROM.
- 1 6. The medium of claim 1, wherein the medium includes an electronic memory.
- 1 7. The medium of claim 1, wherein the medium includes an optical storage medium.
- 1 8. The medium of claim 1, wherein the data structure comprises a database.
- 1 9. The medium of claim 1, wherein the information includes a plurality of refractive
2 index measurements of a strip extracted from the optical member, the plurality of refractive
3 index measurements taken at a plurality of locations normal to a cross-sectional area
4 formed by a radial axis of the optical member and a axis normal to the radial axis.
- 1 10. The medium of claim 1, wherein the at least one field includes a field
2 identifying the optical member.

1 11. The medium of claim 1, wherein the at least one field includes a homogeneity
2 map of the optical member.

1 12. A computer-readable medium having computer-executable instructions for
2 performing a method for characterizing an optical member, the method comprising:
3 providing information corresponding to a plurality of refractive index measurements
4 taken at a plurality of interior locations within the optical member; and
5 converting the information into a three-dimensional map of the optical member, the
6 three-dimensional map including a plurality of refractive index values distributed
7 throughout the interior of the optical member.

1 13. The method of claim 12, wherein the step of providing further comprises:
2 extracting a radial strip from the optical member, the strip having a cross-sectional area in
3 a plane formed by a radial axis of the optical member and an axis normal to the radial axis;
4 and
5 taking a plurality of refractive index measurements of the strip at a plurality of locations in
6 the cross-sectional area.

1 14. The method of claim 12, wherein the step of providing includes transmitting the
2 information using e-mail.

1 15. The method of claim 12, wherein the step of providing includes transmitting the
2 information over the Internet.

1 16. The method of claim 12, wherein the step of providing includes transmitting the
2 information using a telecommunications network.

1 17. The method of claim 16, wherein the network is a wireless network.

1 18. The method of claim 12, wherein the step of providing includes physical
2 delivery of a computer readable medium having stored thereon a data structure, the data

3 structure including at least one field containing information corresponding to a
4 three-dimensional map of the optical member, the map including a plurality of refractive
5 index measurements taken at a plurality of interior locations within the optical member.

1 19. The method of claim 12, further comprising:
2 using the map to locate a portion of the optical member having refractive index
3 values corresponding to specified refractive index values; and
4 extracting the portion to form an optical blank having refractive index values
5 corresponding to specified refractive index values.

1 20. The method of claim 19, further comprising:
2 providing the optical blank; and
3 providing information corresponding to a three-dimensional refractive-index map of
4 the optical blank.

1 21. The method of claim 20, wherein the step of providing information
2 corresponding to a three-dimensional refractive-index map of the optical blank includes
3 transmitting the information using e-mail.

1 22. The method of claim 20, wherein the step of providing information
2 corresponding to a three-dimensional refractive-index map of the optical blank includes
3 transmitting the information over the Internet.

1 23. The method of claim 20, wherein the step of providing information
2 corresponding to a three-dimensional refractive-index map of the optical blank includes
3 transmitting the information using a telecommunications network.

1 24. The method of claim 23, wherein the network is a wireless network.

1 25. The method of claim 20, wherein the step of providing information
2 corresponding to a three-dimensional refractive-index map of the optical blank includes
3 physical delivery of a computer readable medium having stored thereon a data structure, the
4 data structure including at least one field containing information corresponding to a
5 three-dimensional map of the optical blank.

1 26. The method of claim 12, further comprising the step of storing data
2 corresponding to the three dimensional map on a medium.

1 27. The method of claim 26, wherein the medium includes paper.

1 28. The method of claim 26, wherein the medium includes an optical storage device.

1 29. The method of claim 26, wherein the medium includes a floppy disk.

1 30. The method of claim 26, wherein the medium includes a hard disk.

1 31. The method of claim 26, wherein the medium includes electronic memory.

1 32. The method of claim 26, wherein the medium includes a compact disk.

1 33. A method for making an optical device having specified refractive-index
2 characteristics, the optical device being derived from a boule being dimensionally
3 characterized by a radial axis and an axis normal to the radial axis, the method comprising:
4 extracting a radial strip from the boule, the strip having a cross-sectional area in a
5 plane formed by the radial axis and the axis normal to the radial axis;
6 taking a plurality of refractive index measurements of the strip at a plurality of
7 locations in the cross-sectional area; and
8 converting the plurality of refractive index measurements into a three-dimensional
9 map of the boule, the three-dimensional map including a plurality of calculated refractive
10 index values distributed throughout the interior of the boule.

1 34. The method of claim 33, further comprising the step of creating a homogeneity
2 map of the optical blank.

1 35. The method of claim 33, wherein the step of taking is performed using a phase
2 measuring interferometer.

1 36. The method of claim 33, wherein the step of taking is performed using the
2 PHOM method.

1 37. The method of claim 33, wherein the step of taking is performed using the index
2 oil method.

1 38. The method of claim 33, wherein the strip has a width in a range between X-mm
2 and Y-mm.

1 39. The method of claim 33, wherein the step of extracting includes grinding and
2 polishing each surface of the strip.

1 40. The method of claim 33, further comprising:

2 integrating calculated refractive index values along the normal axis at a plurality of
3 points on the radial axis to thereby create a calculated two-dimensional map of calculated
4 two dimensional values;

5 using the plurality of refractive index measurements to create a measured two
6 dimensional map;

7 taking the difference of the calculated two dimensional values from corresponding
8 ones of the plurality of refractive index measurements to generate difference values; and

9 distributing the difference values along the normal axis to create a quasi three

10 dimensional map of refractive index values distributed throughout the boule.

1 41. The method of claim 33, further comprising:
 2 providing the optical blank; and
 3 providing information corresponding to a three-dimensional refractive-index map of
 4 the optical blank.

1 42. The method of claim 41, wherein the step of providing information
 2 corresponding to a three-dimensional refractive-index map of the optical blank includes
 3 transmitting the information using e-mail.

1 43. The method of claim 41, wherein the step of providing information
 2 corresponding to a three-dimensional refractive-index map of the optical blank includes
 3 transmitting the information over the Internet.

1 44. The method of claim 41, wherein the step of providing information
 2 corresponding to a three-dimensional refractive-index map of the optical blank includes
 3 transmitting the information using a telecommunications network.

1 45. The method of claim 44, wherein the network is a wireless network.

1 46. The method of claim 41, wherein the step of providing information
 2 corresponding to a three-dimensional refractive-index map of the optical blank includes
 3 physical delivery of a computer readable medium having stored thereon a data structure, the
 4 data structure including at least one field containing information corresponding to a
 5 three-dimensional map of the optical blank.

1 47. The method of claim 33, further comprising the step of storing data
 2 corresponding to the three dimensional map on a medium.

1 48. The method of claim 47, wherein the medium includes paper.

1 49. The method of claim 47, wherein the medium includes an optical storage device.

1 50. The method of claim 47, wherein the medium includes a floppy disk.

1 51. The method of claim 47, wherein the medium includes a hard disk.

1 52. The method of claim 47, wherein the medium includes electronic memory.

1 53. The method of claim 33, further comprising the step of extracting an optical
2 blank from the boule, the optical blank being taken from a portion of the boule having
3 calculated refractive index values that substantially match the specified refractive-index
4 characteristics.

1 54. The method of claim 33, further comprising the step of utilizing the
2 three-dimensional map to identify a portion of the boule that corresponds to a
3 predetermined specification.

1 55. The method of claim 33, further comprising the step of storing information
2 corresponding to the three-dimension map on a medium.

1 56. The method of claim 55, wherein the information includes human readable
2 indicia.

1 57. The method of claim 55, wherein the information includes machine readable
2 indicia.

1 58. The method of claim 55, wherein the medium is a computer readable medium.

1 59. The method of claim 55, wherein the medium is an optical medium.

1 60. The method of claim 55, wherein the medium includes a paper medium.

1 61. The method of claim 33, further comprising the step of transmitting information
2 corresponding to the three-dimension map over an electronic medium.

1 62. The method of claim 33, further comprising the step of transmitting information
2 corresponding to the three-dimension map over an optical medium.

1 63. The method of claim 33, further comprising the step of providing information
2 corresponding to the three-dimension map to a customer.

1 64. A method for processing a request for an optical device having predetermined
2 refractive-index characteristics, the method comprising:
3 taking a plurality of refractive index measurements at a plurality of interior locations
4 within a boule;
5 converting the plurality of refractive index measurements into a three-dimensional
6 map of the boule, the three-dimensional map including a plurality of refractive index values
7 distributed throughout the interior of the optical member; and
8 providing information corresponding to the three-dimensional map.

1 65. The method of claim 64, wherein the step of providing information
2 corresponding to a three-dimensional refractive-index map of the optical blank includes
3 transmitting the information using e-mail.

1 66. The method of claim 64, wherein the step of providing information
2 corresponding to a three-dimensional refractive-index map of the optical blank includes
3 transmitting the information over the Internet.

1 67. The method of claim 64, wherein the step of providing information
2 corresponding to a three-dimensional refractive-index map of the optical blank includes
3 transmitting the information using a telecommunications network.

1 68. The method of claim 67, wherein the network is a wireless network.

1 69. The method of claim 64, wherein the step of providing information
2 corresponding to a three-dimensional refractive-index map of the optical blank includes
3 physical delivery of a computer readable medium having stored thereon a data structure, the
4 data structure including at least one field containing information corresponding to a
5 three-dimensional map of the optical blank.

1 70. The method of claim 64, further comprising the step of storing data
2 corresponding to the three dimensional map on a medium.

1 71. The method of claim 64, wherein the medium includes paper.

1 72. The method of claim 64, wherein the medium includes an optical storage device.

1 73. The method of claim 64, wherein the medium includes a floppy disk.

1 74. The method of claim 64, wherein the medium includes a hard disk.

1 75. The method of claim 64, wherein the medium includes electronic memory.

1 76. A method for making an optical device having predetermined refractive-index
2 characteristics, the optical device being derived from a boule being dimensionally
3 characterized by a radial axis and an axis normal to the radial axis, the method comprising:
4 placing the boule in a measurement tool;
5 disposing index-matching fluid in an interface volume formed between the boule
6 and the measurement tool, the index-matching fluid having a predetermined refractive
7 index substantially identical to the refractive index of the measurement tool;
8 taking at least one set of refractive index measurements of the boule by directing
9 light into the boule via the measurement tool, the light being directed in a direction normal
10 to a plane formed by the radial axis and the axis normal to the radial axis; and
11 converting the set of refractive index measurements into a three-dimensional map of
12 the boule, the three-dimensional map including a plurality of calculated refractive index
13 values distributed throughout the interior of the boule.